



Standards of Capability Evaluation for Chinese Professional Engineers

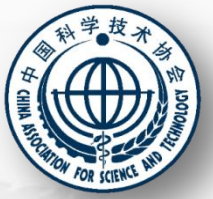
中国工程师能力评价标准

Center for Professional Training and Services of CAST

中国科协培训和人才服务中心

NOV.2018 Beijing

2018.11 北京

A graphic element on the left side of the slide. It consists of a large dark blue triangle pointing to the right, with the word 'Outline' written in white inside it. This triangle is part of a larger, semi-transparent grey shape that also has a triangle pointing right, with three small grey circles at its vertices. The background of the slide is a light grey world map.

Outline

1. Overview of China's engineer system

一、中国工程师制度概况

2. The challenges for China's engineers

二、中国工程师面临的挑战

3. Standards of Capability Evaluation

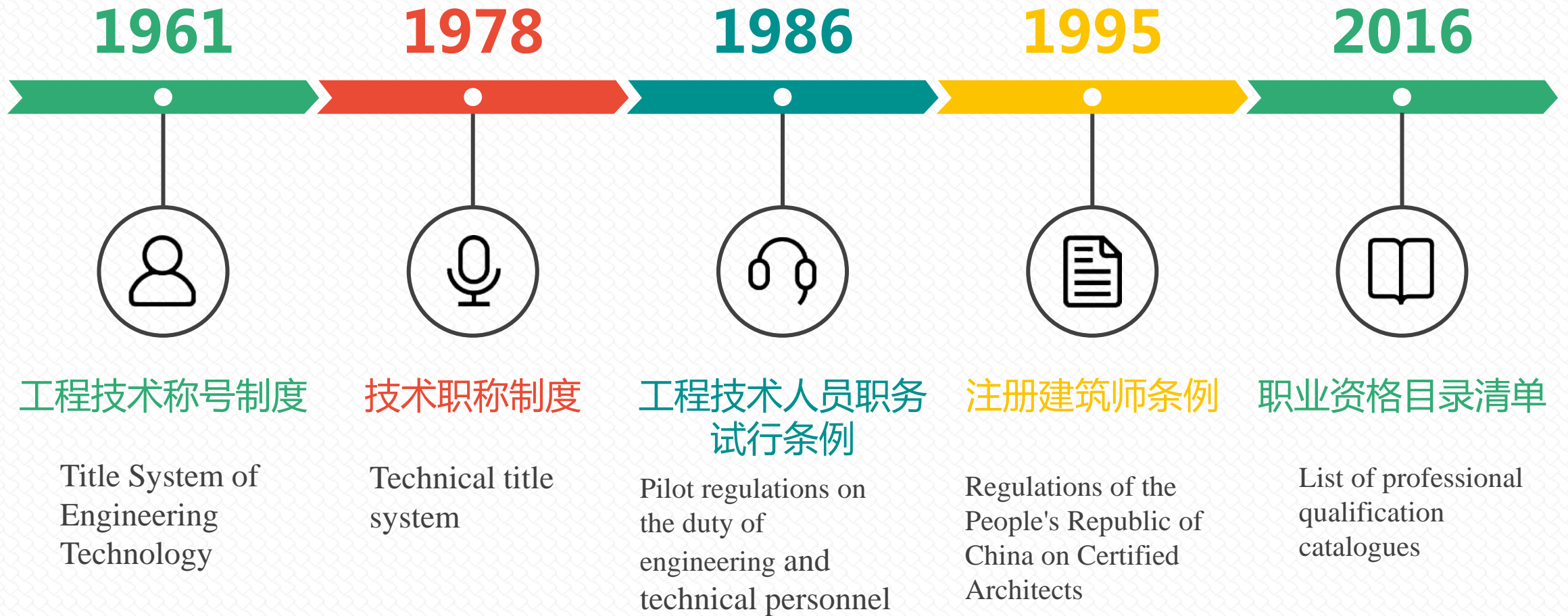
三、工程能力评价标准

1

Overview of China's engineer system
中国工程师制度概况

The development of China's engineer system

中国工程师制度发展历程





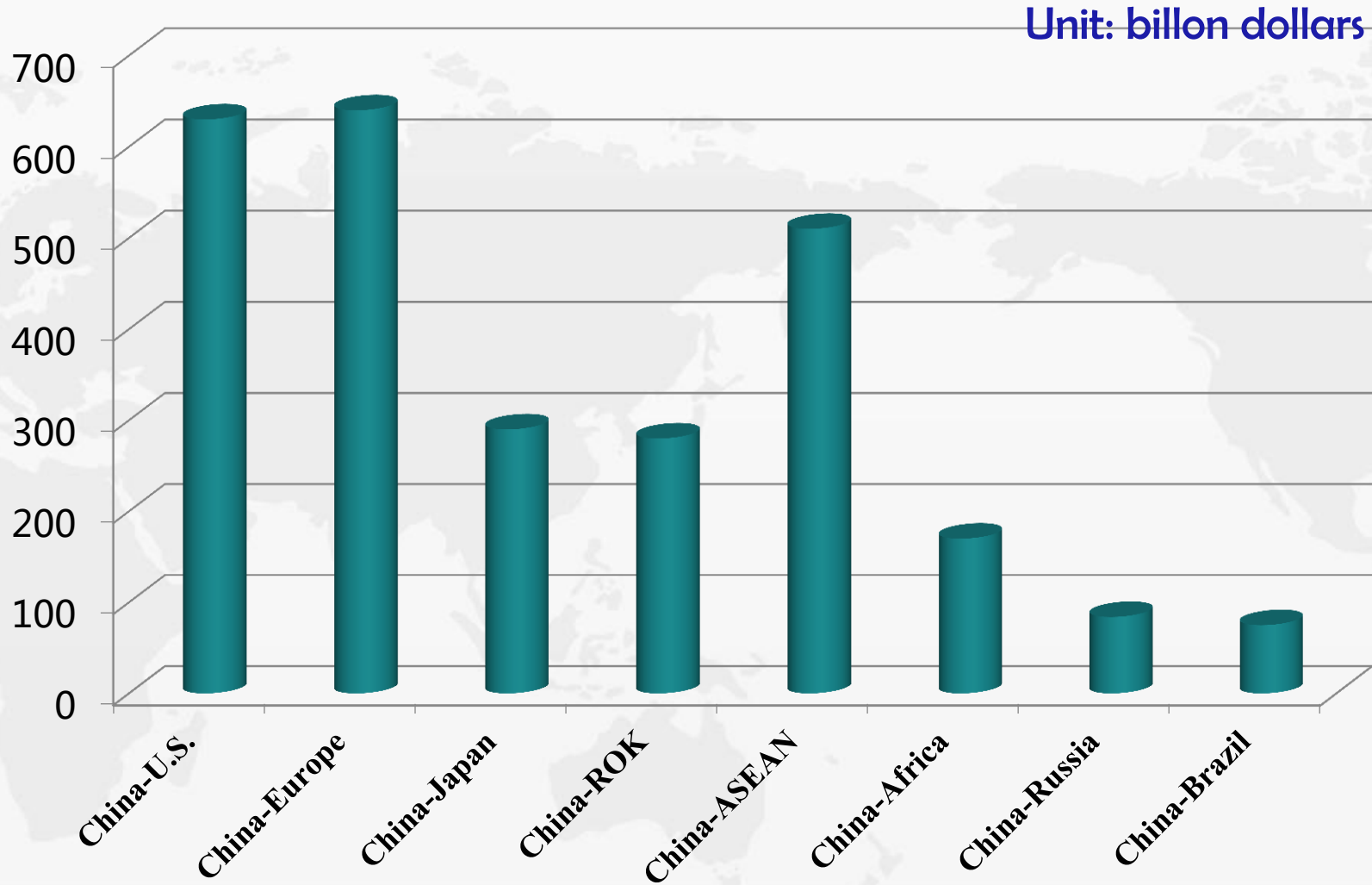
- ◆ **The engineer system: Combining professional titles with professional technical qualifications.**
 - 职称与专业技术资格相结合的工程师制度。
- ◆ **China has about 42,000,000 engineering and technical personnel, the total number of engineering talents in China ranks first in the world.**
 - 中国拥有4200多万人的工程科技人才队伍，中国工程科技人才总量稳居世界第一。

2

The challenges for China's engineers
中国工程师面临的挑战

Total trade volume between China and some economies in 2017

全球一体化
Globalization



全球化视野、跨文化沟通交流能力/**Global Perspective, efficient cross culture communication**



工程师：人与自然和谐共生，经济发展与环境保护并重

Engineer : Harmonious development between man and nature, equal emphasis on economic development and environmental protection

accurate poverty alleviation

Preventing and
resolving major risks

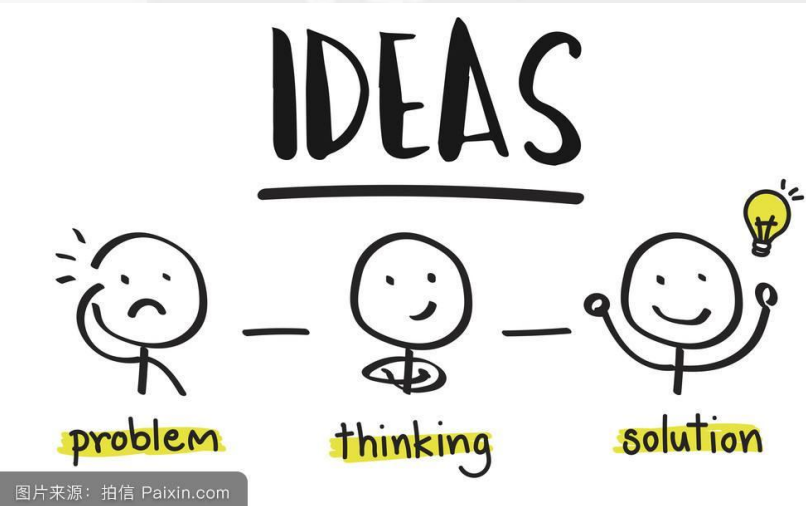


pollution prevention
and control

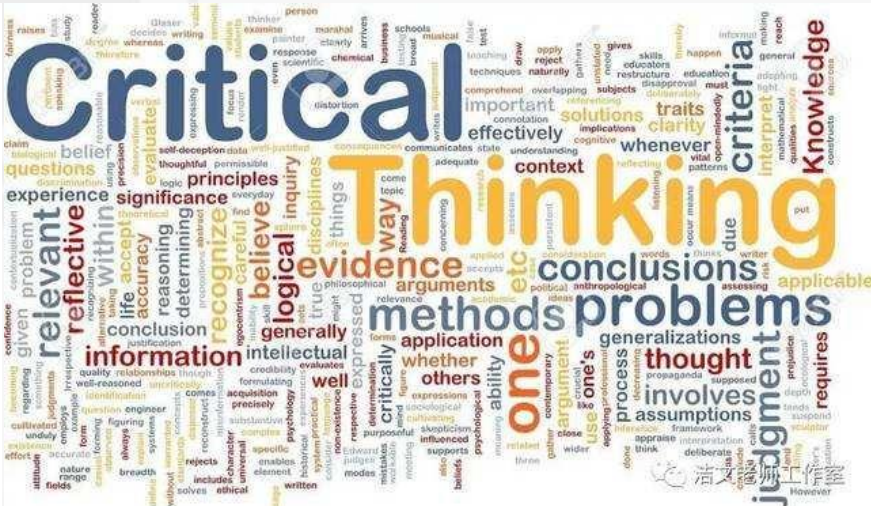
the three major battle

Engineer : Providing cleaner, healthier, safer and more sustainable engineering solutions.

工程师：提供更清洁、更健康、更安全和可持续发展的工程解决方案

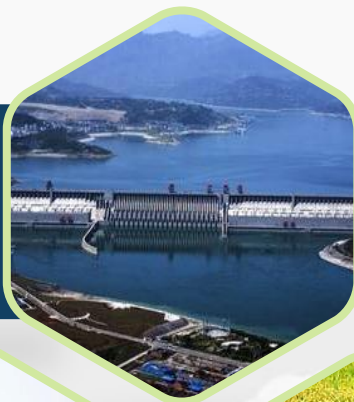


图片来源: 拍信 Paixin.com



重大复杂工程/Great
and complicated engineering

三峡工程
综合效益显著



高铁运行里程
世界第一



西电东送、
西气东输
改变能源结构



上海洋山
深水港开港



港珠澳大桥
正式开通



C919大型客机
首飞成功



Engineer: ability to solve complex engineering problems

工程师：解决复杂工程问题能力

异形:契约 **Alien: Covenant(2017)**

工程伦理
/Engineering ethics



Engineering activities contain value choices that concern the future and destiny of mankind. Every responsible person is facing the torture of the soul: What should we do? What can we do?

工程活动中包含着事关人类前途命运的价值选择，每一位有责任感的人都面临心灵的拷问：我们该做些什么？我们能够做些什么？

3

Standards of Capability Evaluation
工程能力评价标准



我们的愿景/ Our Vision

- 建立国际实质等效的工程师评价标准

Establishing the international equivalent standards of engineers

- 提高工程师职业化、国际化水平

Improving the professionalism and internationalization of engineers

- 促进工程师持续专业发展

Promoting continual professional development for engineers

研制路径/Development Path



参照国际 Reference to international

- IEA
- APEC
- ASEAN
- ECUK
-

协同推进 coordinated advance

- 学会/society
- 企业/enterprise
- 高校/colleges and universities;

同行意见 Peer Opinion

- IET/ECUK
- Engineers Ireland
- Engineering New Zealand
- Engineers Australia
- Board Of Engineers Malaysia
- JABEE日本技士会
- Engineering Council South Africa (ECSA)

标准研制 Developing standards



A: Engineering Knowledge and Professional Competence

A:工程知识与专业能力

A1: Have a good educational background in the engineering major, and have participated in the systematic study on engineering foundation and professional knowledge as well as professional skill training.

A1:具有工程专业教育背景，接受过系统的工程基础和专业知识学习以及专业技能训练。

A2: Be able to solve complicated problems by using mathematics, natural science, engineering fundamentals, expertise and professional skills.

A2:能运用数学、自然科学、工程基础和专业知识和专业技能解决复杂问题。

A3: Be able to collect, analyze, and judge relevant technical information at home and abroad, conduct research on complex problems, propose development directions and ideas, and provide solutions.

A3: 具备收集、分析、判断国内外相关技术信息的能力，能进行复杂问题的研究、提出开发方向和思路，进而提出解决方案。

A4: Have the ability in systematic thinking and innovative thinking, and be able to put forward innovative solutions.

A4:具备系统思维和创新思维能力，能提出创新方案。



B: Engineering and Professional Ethics

B:工程伦理与职业道德

B1: Have a strong sense of social responsibility and professional dedication, be able to correctly apply professional knowledge in work to ensure a harmonious development of the engineering projects, nature and society, and develop a concept of comprehensive, coordinated and sustainable development.

B1:具有较强的社会责任感和敬业精神，能在工作中正确运用专业知识保证工程和自然、社会的和谐发展，树立全面、协调、持续发展理念。

B2: Have the capability to consciously comply with the laws and regulations and technical specifications, and apply the knowledge of quality, safety, energy conservation and environmental protection in engineering practices.

B2:能在工作中自觉遵循法律法规、技术规范和正确运用质量、安全、节能环保知识。

B3: Have the awareness of occupational health and safety, energy conservation, environmental protection, and intellectual property protection, and be able to apply professional knowledge in work to safeguard the above factors.

B3:具有较强的本专业职业健康安全、节能、环保、知识产权保护意识，能在工作中正确运用专业知识维护以上要素。



C: Teamwork and Communicative Competence

C:团队合作与交流能力

C1: Have the capability to formulate engineering documents using engineering languages skillfully and conduct in-depth communication with peers.

C1：能使用工程语言制定工程文件，并与同行深入交流。

C2: Have good teamwork spirit, be able to exercise self-control and understand other people' s intentions.

C2：有团队合作精神和良好的人际交往关系，能够控制自我并理解他人意愿。

C3: Be able to adapt to various environment and apply one' s skills and abilities.

C3:能适应各种环境并发挥自身能力。

C4: Be able to conduct international exchanges and cooperation.

C4:能够进行国际交流与合作。



D: Sustainable Development and Lifelong Learning

D:持续发展与终身学习

D1: Formulate and implement personal career development plan, and actively participate in academic activities in the engineering field.

D1:制定并实施自身职业发展规划；参与业内学术活动。

D2: Be able to proactively track domestic and overseas technical development trends in the engineering field and continuously grasp new knowledge and new skills to apply them in practice.

D2:跟踪本专业国内外技术发展趋势，掌握新知识、新技能，并应用于工作中。



E: Organizational Leadership and Project Management Capability

E:组织领导与项目管理能力

E1: Be able to conduct market research, demand projection and technical and economic analysis, and evaluate the effect and impact of engineering projects.

E1:具备市场调研、需求预测和技术经济分析能力，能评估工程项目的效果和影响。

E2: Be able to build and manage a team, and conduct project monitoring and process management so as to organize and implement engineering projects.

E2:具备团队组建和管理能力，具备项目监控和过程管理能力，进而能组织实施工程项目。

E3: Have the risk control ability, and be capable of predicting risks and proposing risk aversion plans. E3:具备风险管控能力，能进行风险预判并提出风险规避预案。

E4: Have due ability of comprehensive analysis and judgment, and show strong discretion in the course of implementing engineering projects.

E4:具备综合分析、判断能力，能在工程项目实施过程中展现很强的判断力。

E5: Be able to present opinions for decision-making, and be responsible for the decisions.

E5:能提出决策意见，并对所作出的决定负责任。

适用领域/Field of application



- **Civil Engineering**
- 土木工程
- **Electrical Engineering**
- 电气工程
- **Mechanical Engineering**
- 机械工程
- **Railway Engineering**
- 铁路工程
- **Nuclear Engineering**
- 核工程
-

申请人/Applicant

➤ Education

- 教育经历
 - **Minimum Bachelor's or higher-level degree in engineering or related majors recognized by the Ministry of Education of PRC**
 - 教育部承认的工程或相关专业本科以上学历
 - **the degree in the engineering or related majors recognized by the WA overseas**
 - 在海外取得《华盛顿协议》认可的工程类及相关专业学位

申请人/Applicant

➤ Professional work experience

➤ 专业工作经历

- 5 years post graduation; including 2 years in “important engineering post”
- 毕业后至少5年专业工作经历，其中至少2年“重要工程岗位”工作经历

➤ Important engineering post

➤ 重要工程岗位

- Responsible for the planning, design and implementation of the project
- 对工程项目的计划、设计和实施负有判定责任

能力素质评估/Competency assessment

- An assessment of written evidence, plus supporting documentation
- 评估书面材料及佐证文件
- An examination
- 笔试
- A face-to-face interview
- 面试



面试/Interview assessment

Professional Review
Interview
认证面试

Interviewers will examine the five competence and commitment statements
面试官需考核下列五项能力素质和责任

Format
形式

Presentation by candidate, Q & A
候选人陈述，问答

A

B

C

D

E

Ability to work with
technology
运用技术的能力

Apply engineering
methods
运用工程方法的能力

Project, process &
resource skills
项目、流程和资源技能

Communication &
team skills
交流和团队合作技能

Professional approach
职业方式

Engineering and Technology 工程和技术
Discipline Specific 专业领域的技能

Common Skills
通用技能

批准与注册/Approval and Registration

- Applicant details sent to “Alliance”
- 向“联盟”递送申请人的详细材料
- Alliance issues registration numbers
- 联盟签发注册号
- Professional Engineer Certificates
- 专业工程师证书
- Engineering field(s)
- 工程领域
- Validity
- 有效期

持续专业发展/CPD

- No less than 40 study hours /year
- 每年不低于40学时
 - Knowledge training or exams
 - 知识培训或考试
 - Seminars, technical investigations
 - 研讨会、技术调研
 - Development of industry codes/standards
 - 制定行业规范/标准
 - Publications 出版物
 - Lectures/Conference speeches
 - 讲座/会议发言
 - Consultancy 咨询
 - Self - study 自学



组织结构/ Organization structure



Comparison among CAST 、 IEA and ECUK

	CAST	IEA	UK-SPEC
A	A1	1	A1
	A2	2	A1
	A3	3	B2
	A4	4	B3
B	B1	6	E1, E4
	B2	7	E1, E2, E3, E4
	B3	8	E2, E3, E5
C	C1	10	D1, D2
	C2		D3
	C3		D3
	C4		D3
D	D1	11	E4
	D2		A2, B1
E	E1	5	B1
	E2	9	C1, C3
	E3	12	C2
	E4		B2, B3
	E5	13	D1, D2

The comparison shows good alignment between the competence requirements of the General Specification and the requirements for competence and commitment of IEA and UK-SPEC.

CAST、IEA、UK-SPEC关于工程师能力素质要求具有高度一致之处。

International cooperation in engineering capacity







值得探讨的问题/Points to ponder

- 什么样的评价方式和方法最有效?

What kind of evaluation ways and methods are most effective?

- 考官应该具备什么的能力素质?

What kind of ability and quality should the examiner possess?

- 什么样的方式对工程师的持续专业业发展最有效?

What is the most effective way for engineers to continuous professional development?

我们希望/We wish



- 加强合作交流

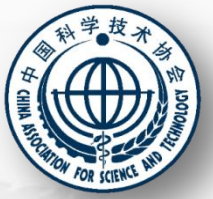
Strengthening cooperation and exchanges

- 逐步形成共识

Gradually form a consensus

- 共同应对挑战

Dealing with challenges together



Thank you for listening